

**ZAPADA KATAHDIN, A NEW STONEFLY
(PLECOPTERA: NEMOURIDAE) FROM THE NORTHEAST**

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Abstract.—*Zapada katahdin*, n. sp. male, female and nymph are described from Baxter State Park, Maine. Descriptions are enhanced by original drawings. Paratypes are recorded from Maine, New Hampshire and Quebec. *Zapada katahdin*, n. sp. is univoltine and emerges during late April. Nymphs were collected only from cold, permanent streams and appear to be restricted to the headwater regions.

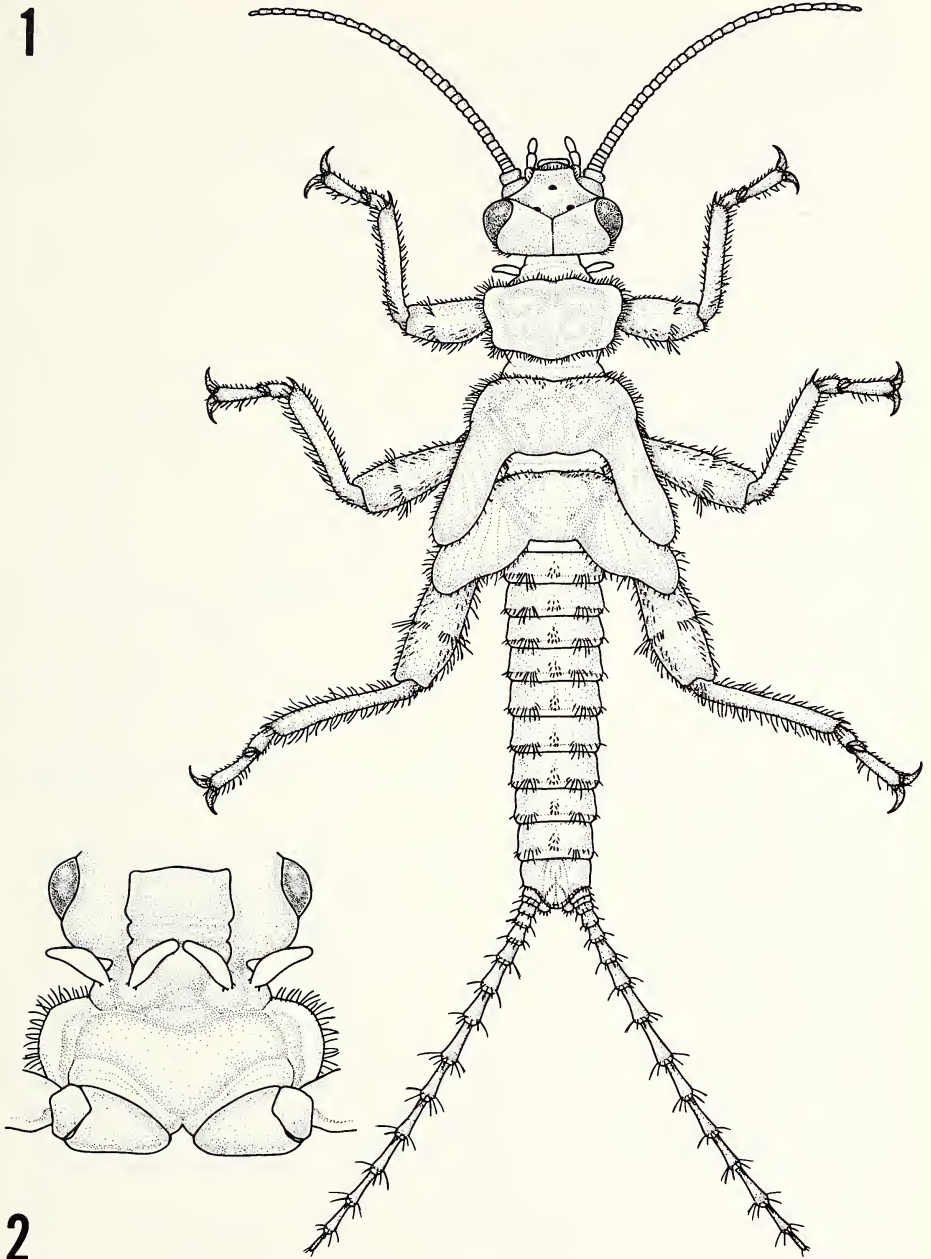
***Zapada katahdin*, new species**

Figs. 1-9

Diagnosis. This species is similar to *Z. haysi* (Ricker) and *Z. oregonensis* (Claassen) but can be separated consistently by characteristics of the male genitalia. Male epiproctal differences: *Z. oregonensis* with large sclerotized projections extending ventrally from lateral arms, midway between apex and curve; *Z. katahdin* with broad sclerotized portion of lateral arms ending before curve and not extending down toward apex as in *Z. haysi*.

Description. Nymph: Length of mature male 7.0-8.0 mm; mature female 8.0-10.0 mm. Pronotum nearly square, slightly wider at anterior margin, bearing fringe of stout spines of nearly equal length. Cervical area with four single gills, two on each side of midline, gills sausage shaped, constricted at base, approximately six times as long as wide at broadest point (Figs. 1, 2).

Male macropterous. Length of forewings 7.0-8.0 mm; length of body 6.0-7.0 mm. General color brown. Legs with darker pigmented areas on coxa, trochanter, tarsi and at junction of femur and tibia. Wings hyaline; forewings with large dark areas at cord and at apex, separated by broad light band. Ninth sternum bearing short broad vesicle, hypoproct narrow at base, expanding laterally to angular points and anterior of vesicle, apex tapering to pointed tip (Fig. 5). Paraprocts with two sclerotized lobes: inner lobe short and thin, outer lobe broad and nearly square (Fig. 5). Epiproct recurved, mostly membranous; dorsal sclerite large at base, extending from midline to lateral margins, narrowing toward apex, curving along lateral margins, producing open area at apex (Fig. 7); lateral arms short, moderately wide and sclerotized (Fig. 6a); ventral sclerite broad at base, becoming narrow most of length, almost enclosed by dorsal sclerite along apical-lateral margins, bearing 13-15 stout spines laterally, spines arranged in irregular rows (Fig. 6b); basal sclerites formed into elongate triangles. Tenth tergum with concave indentation medially, apex of indentation lightly sclerotized and forming small light triangular shaped area under apex of epiproct (Figs. 3-5).



Figs. 1, 2. *Zapada katahdin*. 1. Nymph, habitus. 2. Prosternum and head, ventral, showing cervical gills.

Female macropterous. Length of forewings 9.0–10.0 mm; length of body 7.0–9.0 mm. Body, appendages and wings similar to male. Body proportions generally more robust in females. Subgenital plate well developed, posterior margin of seventh sternum expanded over most of eighth sternum, plate broadly rounded, slightly truncate apically, expanded portion more darkly sclerotized (Fig. 8). Eighth sternum excavated medially, excavated area lightly sclerotized, except for thin darkly sclerotized band over genital opening.

Holotype. ♂. MAINE: Penobscot Co., Katahdin Stream, Baxter State Park, 24 April 1980, T. M. Mingo (deposited at USNM).

Paratypes. NEW HAMPSHIRE: Coos Co., Tuckermans Ravine, Mt. Washington, 23 June 1941, T. H. Frison and H. H. Ross, 1♀ (INHS). MAINE: Penobscot Co., same data as holotype, 6♂♂ (BYU, UM, USNM, WER); Abol Stream, 1 mile above Abol Falls, Baxter State Park, 24 April 1980, T. M. Mingo, 2♂♂, 10♀♀ (includes allotype female), some specimens were collected as nymphs and emerged in the laboratory between 24 April and 30 April 1980. QUEBEC: Ungava, Koksoak River, 17 June 1966, J. B. Coleman, 2♀♀ (BYU).

Additional material examined (nymphs). LABRADOR: Secret Brook, August 1974, C. F. Rabeni (UM). MAINE: Penobscot Co., Katahdin Stream, above Katahdin Stream campground, Baxter State Park, 23 September 1978, T. M. Mingo (UM); Katahdin Stream at Katahdin Falls, Baxter State Park, 26 October 1979, T. M. Mingo (UM); Abol Stream, 1 mile above Abol Falls, Baxter State Park, 14 April 1980, T. M. Mingo (BYU, UM, USNM).

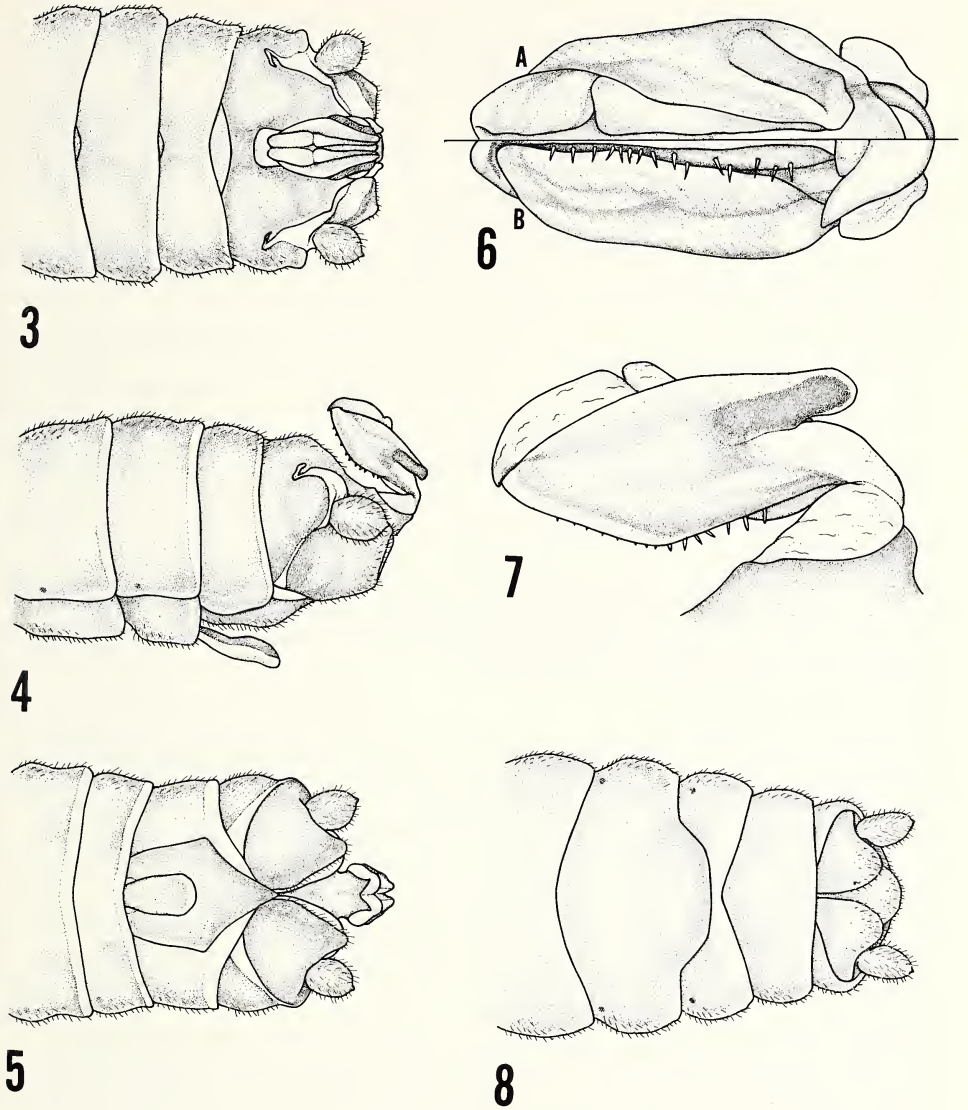
Etymology. The species name is derived from Mt. Katahdin, Maine, the type locality of this stonefly. The name "Katahdin" is an English condensation of the Abnaki Indian words "keght" which means "principal" and "adene" which means a "mountain" (Eckstorm, 1941). Mt. Katahdin, the highest elevation in the state, is a glacial peak that rises abruptly to 5,267 feet from the surrounding terrain in north central Maine.

Biology. The life cycle and seasonal distribution of *Z. katahdin* are shown in Figure 9. The species is univoltine with the nymphal stage lasting approximately twelve months. Early instar nymphs were first collected in late April and early May. Growth is continuous during the spring, summer and fall and maximum growth is attained by late October. *Zapada katahdin* overwinters as mature or nearly mature nymphs and adults emerge the following spring in late April. When adults emerge water temperatures are near 0°C and snow and ice still persist along the stream banks.

The distribution and abundance of nymphs collected from the Mt. Katahdin streams, suggests that specimens in this area represent an isolated, remnant arctic population. Nymphs were collected only from cold, permanent streams and seemed to be restricted to the headwater regions. Nymphal abundance increased markedly toward the headwaters, particularly at elevations $\geq 1,800$ feet. Individual specimens were collected at lower elevations ($\geq 1,000$ feet), however, these were uncommon and probably represented drifting individuals. The maximum water temperature for Katahdin Stream on 24 July was 15°C and it was 18°C for Abol Stream, on 24 July.

A single nymphal specimen belonging to this genus was collected from Avalanche Brook, Baxter State Park, Maine on 22 August. Water temperature was not recorded.

Discussion. Ricker (1952), in his revision of the North American Nemouridae,



Figs. 3-8. *Zapada katahdin*. 3. Male terminalia, dorsal. 4. Male terminalia, lateral. 5. Male terminalia, ventral. 6. Epiproct: a, dorsal; b, ventral. 7. Epiproct, lateral. 8. Female terminalia, ventral.

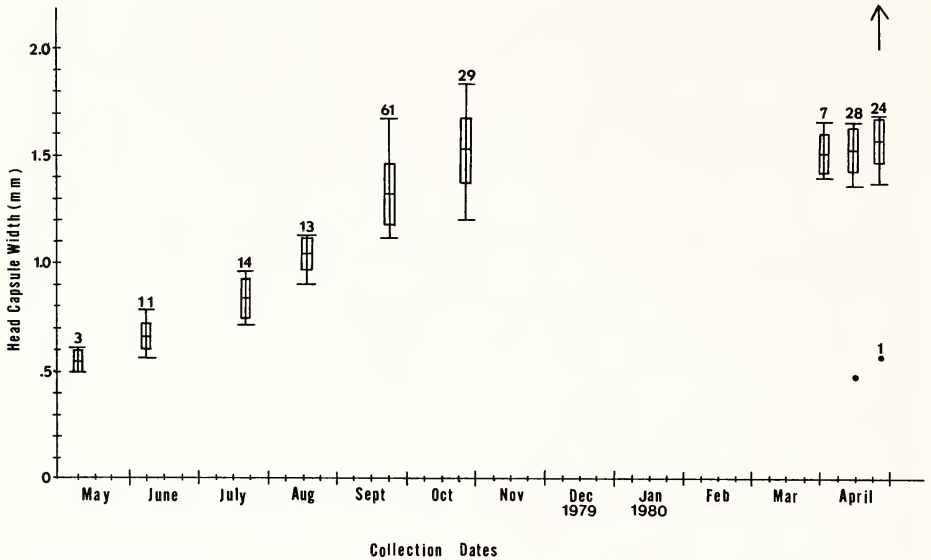


Fig. 9. Life cycle and seasonal distribution of *Z. katahdin*, n. sp. in Baxter State Park, Maine (combined data from Katahdin Stream and Abol Stream). Bars represent mean, standard deviation and range of head capsule widths for each sample period. Number above bar represents sample size and arrow indicates adult emergence.

described *Zapada chila* from Great Smoky Mountains National Park and published the first report of a *Zapada* specimen from northeastern North America. His report was based on a single female specimen collected at Tuckermans Ravine, a protected glacial cirque on the eastern slope of Mt. Washington, New Hampshire, on 23 June 1941, by T. H. Frison and H. H. Ross. The specimen was at first thought to belong to the western species *Zapada oregonensis* (Claassen) (Ricker, 1952; Hitchcock, 1969) but was later believed to be allied to, or possibly the same as, another western species *Zapada haysi* (Ricker) (Ricker et al., 1968; Hitchcock, 1974). The specimen was re-examined by Baumann and Gaufin (1971) and found not to belong to any known species.

Additional *Zapada* specimens have been reported from eastern Canada (Ricker et al., 1968; Harper and Hynes, 1971) and from the northeastern United States (Mingo, 1983), however, a final decision concerning their identity cannot be made until males have been studied.

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Collections cited in text are abbreviated as follows: BYU—Brigham Young University, Provo, Utah; INHS—Illinois Natural History Survey, Champaign, Illinois; UM—University of Maine, Orono, Maine; USNM—National Museum of Natural History, Washington, D.C.; WER—William E. Ricker, Nanaimo, British Columbia, Canada.

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